1,147,630

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,147,630

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(Divided out of No. 1,147,629)

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Int. Cl.:—B 27 c 5/10

COMPLETE SPECIFICATION

Router

We, THE STANLEY WORKS, a Corporation organised and existing under the Laws of the State of Connecticut, United States of America, having its principal place of business at New Britain, Connecticut, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to electric routers, and its subject matter is divided from our copending application No. 55041/67 (Serial No. 1,147,629).

The invention consists in an electric router comprising a casing, an electrical motor received within said casing, a pair of arms extending from said casing in generally opposite radial directions, a handle supported on each of said arms for manipulating the router, and trigger operated switch means mounted in each said handle and electrically connected in series to said motor for energizing the same solely upon operation of both said switch means.

The invention will now be described by way of an example with reference to the accompanying drawings in which:—

Figure 1 is a front elevational section view, partly broken away, showing a preferred embodiment of a router constructed in accordance with this invention;

Figure 2 is a side elevational view, partly broken away, of the router in Figure 1; and

Figure 3 is a schematic view of an electrical circuit for the router of Figure 1.

Referring now to the drawing in detail, a preferred embodiment of a power driven router 10 constructed in accordance with this invention is shown compristing a motor unit 12 having an elongated central motor shaft or armature 14 supported in a vertical position within a base 16.

More specifically, the base 16 includes a platform 18 and a pair of upright posts 20, 22 secured thereto and supporting a cylindrical upper base portion 24 for slidably receiving a threaded cylindrical casing 26 of the motor unit 12. The above mentioned parts of the base 16 are preferably cast as a single piece, and a flat work engaging plate 28 formed of any suitable non-marring material is shown attached to the bottom of the platform 18. An opening 30 is formed in platform 18 and in its bottom plate 28 through which a cutting tool 31 can extend to engage a workpiece for grooving, profiling and similar workforming operations.

In the specific illustrated embodiment, the armature 14 is of tubular construction and has an enlarged lower end portion 32 for receiving a conventional collet or chuck 34 for supporting the cutting tool 31. To position the cutting tool 31 at a desired height relative to the material to be worked, adjustable locking means 36 is provided in the upper base portion 24 for securing the motor unit 12 in a selected position within the base 16, and an adjusting ring 38 is threadably attached to casing 26 and seated upon the upper axial end of base 16 to provide a controlled depth of cut in accordance with well-known techniques. The details of locking means 36 are fully described in United States Patent 2,562,143 issued in the name of J. H. Goffrey et al and assigned to the assignee of this invention.

The lower end portion 32 of armature 14 is journaled with a duplex ball bearing assembly 40 snugly mounted on a lower end of motor unit 12 within a bearing housing 42 having a protective cap 44 screwed onto it, and an upper end portion of armature 14 is supported for rotation within a ball bearing assembly 46 suitably mounted within a cylindrical chamber 48 centrally defined in the upper part of the motor unit 12 by a top cover portion 50 thereof which is integral with the threaded casing 26.

A series of peripheral air inlet passages 52 are provided in the motor unit 12 at the junc-

[*Price 4s. 6d.*]

ture of its casing 26 and top cover portion 50, and a plastic fan 54 is fixed to the lower end portion 32 of armature 14 for drawing air in through the inlet passages 52 and exhausting it through air outlet passages such as at 55 in the lower end of the motor unit 12 whereby chips and other particles are blown away from the cutting tool 31 upon operation of the router 10 while at the same time providing cooling air for the drive motor.

The drive motor is a conventional high speed electrical motor having a field 56, suitably secured to the casing 26, and a rotor 58 of a wound rotor construction with an armature commutator 60 at the upper end of the motor unit 12 wherein a pair of commutor brush assemblies 62 (only one being shown in the drawing) are provided, with each assembly having a brush such as at 64 in engagement with the armature commutator 60 for supplying power to the armature in a conventional manner.

A pair of arms 66, 68 are integrally formed with the motor unit 12 to extend outwardly of its top cover portion 50 in generally opposite radial directions for supporting a pair of handle halves 70, 72. The latter are preferably formed with pockets and have suitable caps 74, 76 of plastic construction, e.g. secured within open ends of the handle halves 70, 72 by machine screws such as at 77 to form smoothly contoured handle parts which are firmly and comfortably grasped for easy manipulation of the router 10. By positionally arranging the radial arms 66, 68 to extend radially outwardly of the armature commutator 60, the brush assemblies 62 can be housed within the radial arms 66, 68 such that brushes 64 can be of extra long length sufficient to effect a significantly extended operating life without brush replacement.

For ensuring safe handling of the router 10 even by an inexperienced operator, dual trigger-type switch handles are provided for ensuring that both hands of an operator are safely removed from the cutting tool before the drive motor can be energized.

More specifically, a power cord 78 for connection to a suitable source of electrical power is shown received within an opening in the base of one of the handle parts, and suitable leads are provided for connecting a normally open, push button ON—OFF switch 80 in series with a normally open, variable speed control switch 82 between the power cord 78 and the armature brushes 64 as seen in Figure 3. If desired, the variable speed switch 82 can be on conventional silicon controlled rectifier type connected to the motor in accordance with well known techniques. The ON—OFF switch 80 is shown mounted on handle cap 74 with the variable speed switch 82 provided on the other handle cap 76 such that with switches 80, 82 in series, both hands of an operator must be positioned on the handle parts to close the switches and operate the router 10 thereby providing a highly desirable safety feature while also effecting speed regulation of the drive motor through the variable speed switch 82. The above described control over the drive motor also promotes safety in that the variable speed switch 82 may be used to stop the motor and thus reduce its coast time.

In accordance with another aspect of this invention, a self-gripping lock arrangement is provided to permit safe and easy installation and changing of the router bits without the use of any separate tools. In this regard, the upper end of the armature 14 is shown having a hexagonal nut 83 seated thereon for receipt within a locking member or sleeve 84 having a central opening 85 of hexagonal cross-section conforming to the armature hex nut 83. The upper portion of sleeve 84 has an annular radial projection 86 axially spaced above a radial lip 88 integrally formed on the top cover portion 50 of casing 26, and an imperforate cuff or collar 90 of resilient and durable material such as urethane rubber is fitted onto and extended over projection 86 and the radial lip 88 for maintaining the above mentioned parts in assembled relation while at the same time providing a tight closure to prevent entry of sawdust, chips etc. into the top cover portion 50 of the casing 26.

The collar 90 is normally maintained in an extended condition with the bottom of sleeve 84 in adjacent but axially spaced relation to the armature hex nut 83 by means of a compression spring 92 coiled about the sleeve 84 with upper and lower ends of the spring 92 respectively bearing against radial projection 86 and the outer race of the ball bearing assembly 46. By this arrangement, the biasing force of spring 92 maintains sleeve 84 against rotation while providing the further advantage of accommodating variations within ordinary manufacturing tolerances of the axially stacked components as well as for thermal expansion thereof along the vertical axis of the router 10.

For locking and unlocking chuck 34 relative to the armature 14, the top of router 10 is provided with a rotary knob 96 shown having a downwardly extending drive member or centre post 98. The centre post 98 is preferably formed with a square socket 100 in its lower end for receiving an exposed squared end 102 formed on a threaded upper end portion of a chuck extension member or operating rod 104. The latter is threadably secured to the armature hex nut 83 and held thereby in a vertical position with an enlarged lower end of the operating rod 104 being coaxially attached, e.g., by a removable pin 106 within an upper axial end of the chuck 34 which is thus adapted for replacement for different work forming operations. The centre post 98 of the knob 96 is mounted for rotation within a bushing 108 suitably secured within the sleeve 84, and the post 98 is retained against axial move-

ment relative to bushing 108 and sleeve 84 by any suitable means such as the snap ring 110 whereby when the spring 92 is in its normally extended position shown in Figure 1, the knob 96 is in an inoperative position, as illustrated, just above the squared end 102 of the operating rod 104.

The co-operating parts of the above described interlock arrangement are preferably dimensioned such that centre post 98 bottoms on the armature hex nut 83 to provide a stop upon pressing knob 96 downwardly, the provision of the rubber collar 90 readily permitting simultaneous axial movement of the sleeve 84 and the knob 96.

To prevent spinning of the chuck 34 within the armature 14 during operation of the router 10 as well as to ensure proper tightening and unlocking of the chuck 34 relative to the cutting tool 31, a longitudinal keyway 112 is machined in the chuck 34 for receiving a projecting end portion of a lock pin 114 to rotatably secure the chuck 34 to the armature 14, the lock pin 114 being retained in a sidewall opening in the lower end portion 32 of the armature 14. The keyway 112 is suitably tapered and dimensioned relative to the lock pin 114 to ensure proper release and locking action of the cutting tool 31 upon axial movement of the chuck 34 relative to the armature 14 while yet permitting complete removal of the chuck 34 by unscrewing its operating rod 104 to permit replacement of the chuck. By virtue of the above described internal locking of the router bits, the exposed unsupported length of the cutting tool is minimized to effectively resist lateral loads applied thereto to further ensure long reliable service under rugged operating conditions.

In summary, depression of knob 96 forces sleeve 84 downwardly against the spring force such that the armature hex nut 83 is automatically locked by sleeve 84 simultaneously upon post 98 being fitted over the operating rod 104 with its exposed squared end 102 received in the socket 100 for rotatably coupling the operating rod 104 to the knob 96. While maintaining knob 96 in its depressed or operative position, the operator need only turn the rotary knob 96 for unlocking and tightening the chuck 34 in a one-handed operation for quick and easy installation and replacement of router bits. The above described parts thus coact as an axial slip coupling with the sleeve 84 acting as an anti-rotation retaining member for the armature hex nut 83 while the operating rod 104 and the chuck 34 are axially extended and withdrawn as a unit relative to the armature 14 in response to rotation of the knob 96 in its operative position for effecting locking and unlocking of the cutting tool.

A router of the above described construction provides an arrangement wherein cutting tools may be relatively quickly and easily replaced and wherein the chuck itself is replaceable without major dismantlement of the router. The latter is of a rugged construction which provides for ecomonical manufacture and assembly, ease of handling and safety of operation even by the relatively inexperienced.

WHAT WE CLAIM IS:—

1. An electrical router comprising a casing, an electrical motor received within said casing, a pair of arms extending from said casing in generally opposite radial directions, a handle supported on each of said arms for manipulating the router, and trigger operated switch means mounted in each said handle and electrically connected in series to said motor for energizing the same solely upon operation of both said switch means.

2. A router as claimed in claim 1 wherein one of said switch means is a variable speed control switch for regulating the speed of said motor upon operation of the other of said switch means.

3. A router as claimed in claim 1 or claim 2 wherein said motor includes a cummutator positioned in said upper end of said casing, said arms extending generally radially outwardly of said commutator and wherein commutator brush assemblies are housed within said arms to permit the use of extra long commutator brushes.

MARKS & CLERK,
Chartered Patent Agents,
Agents for the Applicants.

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1147630 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

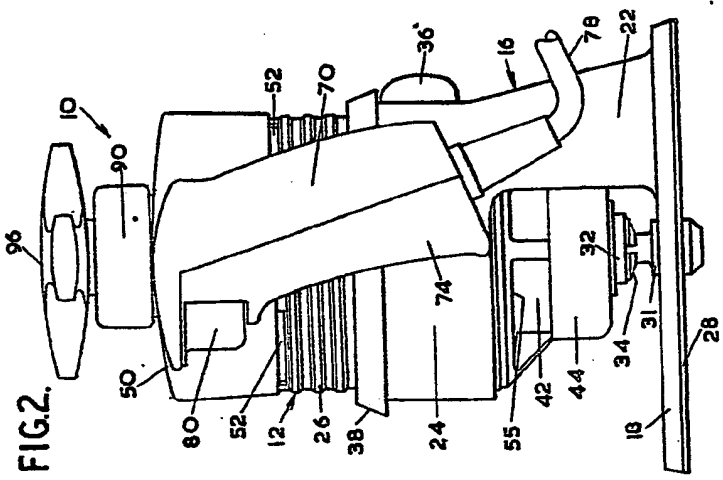

FIG.2.

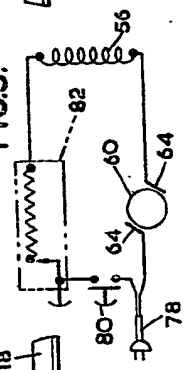

FIG.3.

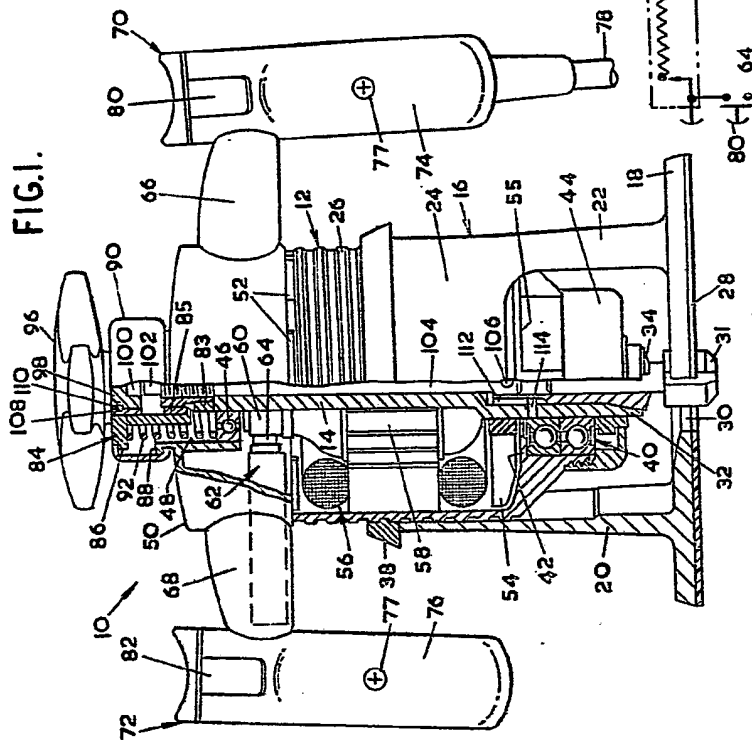

FIG.1.